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EXAMINER

MERKLING, MATTHEW J

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UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES

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*Ex parte* IRAJ PARCHAMAZAD

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Appeal 2009-012150  
Application 09/973,287  
Technology Center 1700

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Before CATHERINE Q. TIMM, LINDA M. GAUDETTE, and  
KAREN M. HASTINGS, *Administrative Patent Judges*.

TIMM, *Administrative Patent Judge*.

DECISION ON APPEAL<sup>1</sup>

I. STATEMENT OF CASE

Appellant appeals under 35 U.S.C. § 134 from the Examiner's decision to reject claims 1-4 under 35 U.S.C. § 102(b) as anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as obvious over Fischer (US

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<sup>1</sup> The two-month time period for filing an appeal or commencing a civil action, as recited in 37 C.F.R. § 1.304, or for filing a request for rehearing, as recited in 37 C.F.R. § 41.52, begins to run from the "MAIL DATE" (paper delivery mode) or the "NOTIFICATION DATE" (electronic delivery mode) shown on the PTOL-90A cover letter attached to this decision.

3,718,506; issued Feb. 27, 1973). We have jurisdiction under 35 U.S.C. § 6(b).

We AFFIRM.

Appellant's invention relates to a reformer, an apparatus that converts a mixture of low-pressure hydrocarbon gas and steam into hydrogen (Spec. 1:2-5; Br. 2). The reformer includes a fuel/steam delivery system comprising coaxial tubes, i.e., an outer tube for delivery of steam, and an inner tube for delivery of the hydrocarbon gas (Spec. 3:12-15). The steam tube has a tip at its end that is gradually reduced in diameter to form a truncated conical tip (*id.*). Claim 1 is illustrative:

1. A reformer for a mixture of low-pressure hydrocarbon gas and steam for fueling a proton-exchange fuel cell with hydrogen from said mixture, comprising:
  - (a) a cylinder loosely packed with a palletized catalyst with a cap at each end,
  - (b) a fuel tube having an outflow end coupled to said cylinder for introducing said hydrocarbon gas into one end of said cylinder at low pressure,
  - (c) a steam tube coaxial with and surrounding said fuel tube for concurrently introducing said hydrocarbon gas and steam at a pressure higher than the pressure of said hydrocarbon gas at said one end of said cylinder, said steam tube having a tip at its outflow end that is gradually reduced in diameter over its length to form a truncated conical tip, said fuel tube having a substantially open end coincident with, and of smaller diameter than said steam tube diameter, and,
  - (d) an outflow tube protruding outwardly from said cylinder at an end of said cylinder opposite said one end,

(e) said steam tube being formed and [sic]<sup>2</sup> to draw said hydrocarbon gas with said steam, and to direct said steam in a path that is at an acute angle with the path of said fuel outflow, said fuel flow path lying substantially along the axis of said coaxial fuel and steam tubes, and that crosses said fuel path at an acute angle from all radial directions.

(Claim 1 (clause labels (a) – (e) added for ease of reference in the discussion below).)

Appellant presents arguments for claims 1 and 2, but does not argue claims 3 or 4 separately. Therefore, we confine our review to the issues arising from Appellant's arguments against claims 1 and 2. Claims 3 and 4 stand or fall with claim 1.

## II. DISPOSITIVE ISSUES

The issues arising are as follows:

1) Does the evidence support the Examiner's finding that Fischer describes either expressly or inherently a reformer structure including the tube structure required by claim 1?

2) Does the evidence support the Examiner's finding that Fischer describes a reformer structure including an inner tube (claimed fuel tube) having the structure further required by claim 2?

## III. DISCUSSION

### A. CLAIM 1

With regard to claim 1, Appellant first reproduces clause (c) of claim 1 and contends that Fischer "does not disclose, or refer to, a fuel tube or

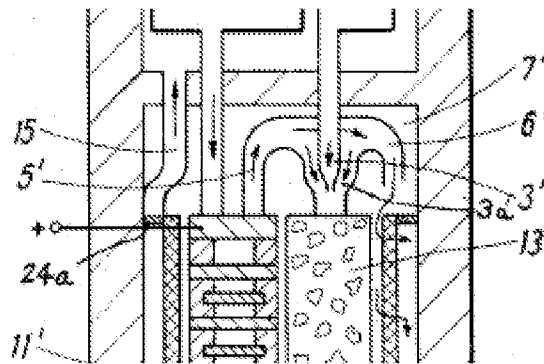
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<sup>2</sup> The Examiner objected to the last clause of claim 1, stating that it should be amended (Final Office Action 3). In response, Appellant states that the word "and" is unnecessary and should be deleted (Br. 5). Therefore, the word "and" at this location in the claim appears to be a typographical error.

steam tube that have these claimed structures though the PTO apparently infers, using impermissible hindsight and appellant's disclosure, the presence of such structures from the depiction of tubes 3a' and 3' in Fig. 2 of [Fischer]." (Br. 5; Reply Br. 1-2).

The Examiner responds that Figure 2 shows the required coaxial tube and tip structure at 3' and 3a' (Ans. 5).

Turning to Fischer, we note that the central portion of Figure 2 shows 3' and 3a' as reproduced below:



Central Portion of Fig. 2

In reference to Figure 1, which depicts a slightly different fuel cell battery (Fischer, col. 3, ll. 38-47), Fischer describes 3a as an annular duct arrangement surrounding nozzle 3 (Fischer, col. 3, ll. 65-68). The structure is depicted in the same way in Figure 2 and the duct 3a' is said to surround nozzle 3' (Fischer, col. 5, ll. 29-31).

We note that, other than to say the Examiner is using impermissible hindsight and Appellant's own disclosure to infer that Figure 2 shows the structure of clause (c), Appellant does not further explain how the structure depicted in Fischer's Figure 2 is different from the structure required by Appellant's clause (c).

We determine that in view of the description of the apparatus in columns 3 and 5 in conjunction with the illustration in Figure 2 of Fischer, it was reasonable for the Examiner to find that Fischer describes a coaxial tube and tip structure meeting the requirements of clause (c) of claim 1. The outer tube (tube surrounding duct 3a') has an outflow end that is of a gradually reduced diameter and can be fairly interpreted as having a truncated conical tip as required by clause (c) of claim 1. Figure 2 depicts such a structure in cross section just above the cylindrical entry pipe leading to reformer 13.

Under the circumstances, we cannot say that Appellant has persuaded us of error on the part of the Examiner with regard to the finding that Fischer describes the structure required by clause (c) of claim 1.

Appellant further argues that Fischer does not disclose that "steam in tube 3a' is drawn into the path of the hydrocarbon fuel flow from tube 3' at an acute angle from all radial directions," as required by clause (e) of claim 1 (Br. 5-6; Reply Br. 2). According to Appellant, there is no disclosure of such a structure, the Examiner has not pinpointed such a disclosure, and there is no basis for asserting that the structure is inherently present because the structure and its effects on steam flow arise in part from the pressure differential between the fuel flow and the steam flow (Br. 5-6; Reply Br. 2).

The Examiner responds that Figure 2 shows the required acute angle and the angle would be acute from any radial direction as claimed (Ans. 5). The Examiner further responds that Fischer explicitly states the feature of drawing the hydrocarbon gas as claimed (Ans. 5).

The evidence supports the Examiner's finding that the angle at which the gas in the duct impinges the hydrocarbon gas would be acute from all radial directions as claimed. The angle is acute due to the gradually reducing diameters of the tubes. Moreover, the tubes are coaxial and the gas is expelled in an annular duct around the nozzle. Therefore, the acute angle would occur at every point around the nozzle.

With regard to the claimed drawing effect on the hydrocarbon gas mentioned in Appellant's argument, Fischer's duct and nozzle are designed to use the jet pump principle, an effect that the Examiner finds is the same as the fluid drawing feature that Appellant refers to in the claim (Fischer, col. 3, l. 66 to col. 4, l. 3; col. 5, ll. 29-33; Ans. 6). Appellant does not dispute this fact (Br. 5-6; Reply Br. 2). The undisputed evidence supports the finding of the Examiner.

In so far as Appellant is relying upon functional differences between what is claimed and what is taught by Fischer, we further note that the claims are directed to an apparatus and must be distinguished from the prior art in terms of structure, rather than function. *See In re Danly*, 263 F.2d 844, 848 (CCPA 1959). We have considered the effects of the claimed functions only in so far as they serve to differentiate the claimed structure from the structure of Fischer.

The evidence as a whole supports the Examiner's finding that Fischer describes either expressly or inherently a reformer structure including a coaxial tube and tip structure as required by claim 1.

## B. CLAIM 2

Claim 2 further requires the fuel tube have “a tip of given length at its outflow end that is reduced in diameter gradually along said given length.”

Appellant’s entire argument is as follows:

The '506 patent [Fischer] states nothing about the structure of fuel nozzle 3' in Figure 2, not even that it is the same as nozzle 3 in Figure 1 of the '506 patent. Regarding nozzle 3 in Fig. 1 of the '506 patent, the '506 patent states only that it is "so dimensioned" to introduce more recycled combustion gas than fresh propane into the mixture delivered to the fuel cell in Fig. 1 of the '506 patent. Appellant's claims do not refer to, or call for delivering recycled combustion gas to either the stem [sic, steam] tube or the hydrocarbon tube.

(Br. 6; Reply Br. 3.)

The Examiner responds that Fischer illustrates the nozzle in Figure 2, which shows the required tip of given length at its outflow end having gradually reducing diameter along that given length (Ans. 6).

We cannot say that Appellant has persuaded us of error in the Examiner’s finding. Fischer describes 3’ as a “nozzle” and Figure 2 depicts a nozzle with a gradually reducing diameter along a given length. This is enough of a description to support the finding of the Examiner.

With respect to the identity of the gas within the duct of Fischer, Appellant has not explained how the difference in chemical composition of the gas in the duct surrounding the fuel tube results in a structural difference in the fuel tube. Moreover, the recitation of a material intended to be worked upon by a claimed apparatus does not differentiate the claimed apparatus structure from the structure of a prior art apparatus. *In re Rishoi*, 197 F.2d 342, 345 (CCPA 1952).



The evidence as a whole supports the Examiner's finding that Fischer describes a reformer structure including an inner tube (claimed fuel tube) having the structure further required by claim 2.

#### IV. CONCLUSION

On the record before us, we sustain the rejection of claims 1-4 under 35 U.S.C. § 102(b) as anticipated by, or in the alternative, obvious over Fischer.

#### V. DECISION

The decision of the Examiner is affirmed.

#### VI. TIME PERIOD FOR RESPONSE

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a).

AFFIRMED

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